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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/686,896	10/15/2003	Alan R. Arthur	200311582-1	7536

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EXAMINER

CHUO, TONY SHENG HSIANG

ART UNIT	PAPER NUMBER
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1745

DATE MAILED: 08/30/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.		Applicant(s)	
	10/686,896		ARTHUR ET AL.	
	Examiner		Art Unit	
	Tony Chuo		1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 July 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-65 is/are pending in the application.
- 4a) Of the above claim(s) 39-60 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7, 9-24, 29-38 and 61-65 is/are rejected.
- 7) ☒ Claim(s) 8 and 25-28 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10/15/03 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

1. Claims 1-65 are currently pending. Claims 39-60 stand withdrawn as being drawn to a non-elected group. The claim objection of claim 29 is withdrawn. The 112 rejections of claims 8, 25-30, and 37-38 are withdrawn. Claims 1-7, 9-24, 30-36, and 61-65 do not overcome the previously stated 102 and 103 rejections. Therefore, claims 1-7, 9-24, 29-38, and 61-65 stand rejected under the following 102 and 103 rejections. Claims 8, 25-28 stand objected to as being dependent upon rejected base claims. This action is made FINAL as necessitated by the amendment.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1-3, 11, 12, 16, 33, 34, 36, and 61-64 are rejected under 35 U.S.C. 102(a) (e) as being anticipated by Haluzak (US 2003/0022051). The Haluzak reference teaches a fuel cell system comprising fuel cell layers that each comprise a substrate "62"; an array of fuel cells "60" each having an anode, cathode, and electrolyte; conductors "78" electrically coupled to fuel cell array that are located on the

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cathode side of substrate; fuel flow channels "52" in anode side of substrate; cathode air flow channels "54" in cathode side of substrate; fuel inlet "70" and fuel outlet "72" in substrate where the fuel inlet and outlet are in fluid communication with fuel flow channels (See Figures 3-5). It also teaches an electrolyte "42" that seals the non-active portion of the substrate "62" (See Figures 4-6). It also teaches fuel cell stacks that are alternately stacked (See paragraph [0040]). It also teaches inlets, outlets, and perimeter of array that are sealed with epoxy (See paragraph [0037]). It also teaches fuel cell layers that are coupled to form a parallel electrical circuit (See paragraph [0042]). Although the cathode air inlet and outlet are not shown in the figures, it is inherent that the air inlet and air outlet are fluidly coupled to each cathode air flow channel. It also teaches a means for removing electricity from the array of fuel cells by connecting the electrodes to known structures to allow electrons to flow from the anode to the cathode (See paragraph [0023]).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 4-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Haluzak (US 2003/0022051) in view of Wilkinson et al (US 5773160). The Haluzak reference is applied to claims 1-3, 11, 12, 16, 33, 34, 36, and 61-64 for reasons stated

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above. However, the reference does not expressly teach a cathode air inlet and air outlet in communication with the air flow channel in the substrate, fuel inlet and outlet in the first and second opposing corner portions and air inlet and outlet in third and fourth opposing corner portions of the substrate, and a substantially rectilinear substrate. The Wilkinson reference teaches a flow field plate that could also be a substrate for fuel cells that is rectilinear and comprises a fuel inlet "244" and fuel outlet "246" in the first and second opposing corner portions and an air inlet "240" and air outlet "242" in third and fourth opposing corner portions of the substrate (See Figure 6A). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Haluzak fuel cell to include cathode air inlets and outlets in the substrate with the fuel inlet and outlet in the first and second opposing corner portions and air inlet and outlet in third and fourth opposing corner portions of the substrate so that the overall size of the fuel cell can be reduced by centrally locating the inlets and outlets on the same substrate.

6. Claims 9, 10, 30-32, and 65 are rejected under 35 U.S.C. 103(a) as being unpatentable over Haluzak (US 2003/0022051) in view of Takayanagi (JP 08-213043). The Haluzak reference is applied to claims 1-3, 11, 12, 16, 33, 34, 36, and 61-64 for reasons stated above. However, the reference does not expressly teach fuel flow channels along a first axis and cathode air flow channels along a second axis disposed at an angle that is substantially normal to the first axis. The Takayanagi reference teaches a layered fuel cell with fuel flow channels "45" that are perpendicular to the cathode air flow channels "44" (See Drawing 4). Therefore, it would have been obvious

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to one of ordinary skill in the art at the time the invention was made to modify the Haluzak fuel cell to include fuel flow channels that are perpendicular to the cathode air flow channels so that the fuel gas and air gas can be more efficiently delivered to the fuel cells.

7. Claims 13 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Haluzak (US 2003/0022051) in view of Voss et al (US 6832647). The Haluzak reference is applied to claims 1-3, 11, 12, 16, 33, 34, 36, and 61-64 for reasons stated above. However, the reference does not expressly teach flow modification features that comprise baffles that are associated with the fuel flow channels and cathode air flow channels. The Voss reference teaches a baffle "19" associated with a flow channel (See Figure 2). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Haluzak fuel cell to include baffles in the flow channels so that the fuel and air gases can be distributed more evenly throughout the fuel cell.

8. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Haluzak (US 2003/0022051). The Haluzak reference is applied to claims 1-3, 11, 12, 16, 33, 34, 36, and 61-64 for reasons stated above. However, the reference does not expressly teach conductors located on the anode side of the substrate that serve as the circuit side of the fuel cell layer. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Haluzak fuel cell to include conductors on the anode side because the rearrangement of parts was held to have been obvious (In re Japikse 86 USPQ 70 (CCPA1950)).

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9. Claims 17-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Haluzak (US 2003/0022051) in view of Takayanagi (JP 08-213043). The Haluzak reference is applied to claims 1-3, 11, 12, 16, 33, 34, 36, and 61-64 for reasons stated above. In addition, the Haluzak reference teaches a fuel cell layer that shares a fuel flow channel with a first adjacent fuel cell layer and a fuel cell layer that shares a cathode air flow channel with a second adjacent fuel cell layer (See Figure 5).

However, the reference does not expressly teach flow channels that form flow plenums or fuel inlet and outlet that form plenums. The Takayanagi reference does teaches flow channels that form fuel inlet, fuel outlet, air inlet, and air outlet manifolds (See Figure 3). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Haluzak fuel cell to include fuel inlet and outlet manifolds that are formed with the fuel flow channels and air inlet and outlet manifolds that are formed with the air flow channels so that fuel gas and air gas can be more efficiently delivered to the fuel cells.

10. Claim 22-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Haluzak (US 2003/0022051) in view of Takayanagi (JP 08-213043) as applied to claims 16-21 and further in view of Wilkinson et al (US 5773160). However, the references do not expressly teach cathode air inlets and cathode air outlets in the substrate. The Wilkinson reference does teach a cathode air inlet and a cathode air outlet in the same substrate (See Figure 6A). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Haluzak fuel cell to include the cathode air inlet and outlet in the same substrate with the fuel inlet and

outlet so that the overall size of the fuel cell can be reduced by centrally locating the inlets and outlets on the same substrate.

11. Claims 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over Haluzak (US 2003/0022051) in view of Nguyen (US 6503651). The Haluzak reference is applied to claim 16 for reasons stated above. However, the reference does not expressly teach fuel flow channels or air flow channels comprising ports that can be opened or closed to selectively activate or deactivate each individual layer of the plurality of layers. The Nguyen reference teaches a fuel cell stack comprising ports "353", "354", "355" with valves "340" that can be opened or closed to selectively activate or deactivate each individual fuel cell in the fuel cell stack (See Figure 6). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Haluzak fuel cell to include fuel flow channels or air flow channels comprising ports that can be opened or closed to selectively activate or deactivate each individual layer of the plurality of layers in order to improve the nonuniformity in flow resistance among the cells in the stack that leads to nonuniform cell-to-cell performance and non-optimal stack performance.

12. Claim 35 is rejected under 35 U.S.C. 103(a) as being unpatentable over Haluzak (US 2003/0022051) in view of Mook et al (US 2003/0235745). The Haluzak reference is applied to claims 1-3, 11, 12, 16, 33, 34, 36, and 61-64 for reasons stated above. However, the reference does not expressly teach seals that comprise an electrically conductive material. The Mook reference does teach a seal that is electrically conductive (See Abstract). Therefore, it would have been obvious to one of ordinary

skill in the art at the time the invention was made to modify the Haluzak fuel cell to include seals that are electrically conductive in order to allow the flow of electric current between the anode and the cell manifold.

13. Claims 37 and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Haluzak (US 2003/0022051) in view of Takayanagi (JP 08-213043) and Wilkinson et al (US 5773160) as applied to claim 24 above, and further in view of Nguyen (US 6503651). However, the references do not expressly teach fuel and cathode air manifolds that have a plurality of selectively opened inlet ports coupled to flow plenums disposed with the inlet plenum, and exhaust manifold that have a plurality of selectively opened inlet ports coupled to flow plenums disposed with the exhaust plenum. The Nguyen reference teaches a fuel cell stack comprising ports "353", "354", "355", "356", "357", "358" with valves "340" that can be opened or closed to selectively activate or deactivate each individual fuel cell in the fuel cell stack (See Figure 6). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Haluzak/Takayanagi/Wilkinson fuel cell to include fuel and cathode air manifolds that have a plurality of selectively opened inlet ports coupled to flow plenums disposed with the inlet plenum and exhaust manifold that have a plurality of selectively opened inlet ports coupled to flow plenums disposed with the exhaust plenum in order to improve the nonuniformity in flow resistance among the cells in the stack that leads to nonuniform cell-to-cell performance and non-optimal stack performance.

Allowable Subject Matter

14. Claims 8 and 25-28 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The Haluzak reference teaches conductors that are electrically coupled to the fuel cell array. However, it does not expressly teach conductors that comprise a positive conductor extending to the cathode air inlet and a negative conductor extending to excess cathode air outlet.

Response to Arguments

15. Applicant's arguments filed 7/6/06 have been fully considered but they are not persuasive. In response to the applicant's argument that Haluzak does not teach or suggest a fuel flow channel that is defined in one side of a substrate and a cathode air flow channel that is defined in a second side of the substrate, figures 4 and 5 do show fuel flow channels "52" defined on anode side of the substrate and cathode air flow channels defined on the cathode side of the substrate. In response to the applicant's argument that Wilkinson does not teach a fuel cell layer in which a substrate on which are disposed an array of fuel cells, the Wilkinson reference does not have to teach an array of fuel cells disposed on a substrate because it is a secondary reference that is used to modify the primary reference. In response to the applicant's argument that Voss reference does not teach flow modification features in connection with a fuel or air flow channel of a fuel cell system, Voss reference teaches baffles that can be used as flow modification features when they are used to modify the Haluzak flow channels. In

addition, the limitation "flow modification features" does not impart a specific flow structure to distinguish over the prior art. In its broadest reasonable interpretation, it simply refers to any feature capable of allowing flow of a fluid.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

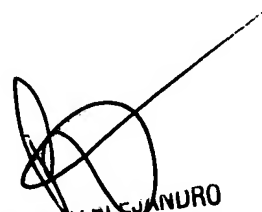
A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tony Chuo whose telephone number is (571) 272-0717. The examiner can normally be reached on M-F, 8:30AM to 5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

TC



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PRIMARY EXAMINER